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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/761,142	01/20/2004	David A. Waldman	3174.1016-001	8777
21005 7590 12/19/2007 HAMILTON, BROOK, SMITH & REYNOLDS, P.C. 530 VIRGINIA ROAD P.O. BOX 9133 CONCORD, MA 01742-9133			EXAMINER BIBBINS, LATANYA	
			ART UNIT 2627	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary**

Application No.

10/761,142

Applicant(s)

WALDMAN ET AL.

Examiner

LaTanya Bibbins

Art Unit

2627

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 24 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 49,50,52-63,65-67 and 86 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 49,50,52-63,65-67 and 86 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 January 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

### DETAILED ACTION

1. In the remarks filed on September 24, 2007, Applicant amended claims 49, 52-63, and 65-67, cancelled claim 51, added claim 86, and submitted arguments for allowability of pending claims 49, 50, 52-63, 65-67, and 86.

### *Response to Arguments*

2. Applicant's arguments with respect to claims 49, 50, 52-63, 65-67, and 86 have been considered but are moot in view of the new grounds of rejection.

### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 49, 50, 52, 56-63, 65-67, and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewald (US Patent Number 5,566,387 in view of Jang et al. (Holographic Data Storage by Combined Use of Peristrophic, Angular, and Spatial Multiplexing)).**

Regarding claim 49, Dewald discloses an apparatus for recording holographically stored information comprising: at least one portion of an aspherical reflecting surface having two focal points (see the elliptical mirror of Figure 2 element 76 and the discussion in column 6 lines 14-18); at least one additional reflecting surface

(see the rotating mirror of Figure 2 element 70); a motive device for rotating at least one of either at least one portion of the aspherical reflecting surface or the at least one additional reflecting surface about a first axis (see Figure 2 element 72 and the discussion in column 6 lines 1-5 and column 7 line 62- column 8 line 12) means for directing an object beam and a reference beam that are mutually coherent along their respective optical paths (see optical elements 48, 56, 60, 62, 64, 70, and 76 of Figure 2 and the discussion in column 5 lines 43-column 6 line 21), wherein either an object beam or a reference beam is reflected from at least one portion of the aspherical reflecting surface to intersect and form an interference pattern with the reference beam or the object beam at a storage location in a recording media at or near one of the two focal points (column 6 lines 14-31). Dewald fails to disclose that the motive device rotates at least one of either at least one portion of the aspherical reflecting surface or the at least one additional reflecting surface independently about a second axis, perpendicular to the first axis.

Jang, however, discloses a motive device that rotates at least one of either at least one portion of the aspherical reflecting surface or the at least one additional reflecting surface about a first axis and, independently, a second axis, perpendicular to the first axis (see the discussion in the Introduction section on page 2975 particularly regarding peristrophic multiplexing and the combination of peristrophic and angle multiplexing and the discussion on page 2976 sections 2.1 and 2.2).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Jang into the holographic

storage apparatus of Dewald. One of ordinary skill in the art at the time the invention was made would have been motivated to combine the teachings in order to provide a simple and obvious method of increasing the storage capacity by combining at least two multiplexing techniques (as suggested in the first and second paragraphs of the Introduction section of Jang on page 2975).

**Regarding claim 50**, the combination of Dewald and Jang disclose the apparatus of claim 49 wherein at least one portion of the aspherical reflecting surface is a portion of an ellipsoidal reflecting surface (see Dewald Figure 2 element 76 and column 6 lines 10-13).

**Regarding claim 52**, the combination Dewald and Jang teach the apparatus of claim 49 wherein the motive device for rotating the additional reflecting surface is a two-dimensional galvanometer (see Jang page 2976 column 2 and the discussion of the galvanometer-based x-y optical scanning system).

**Regarding claim 56**, the combination Dewald and Jang disclose the apparatus of claim 50 wherein a first focus of the ellipsoidal reflecting surface is located on at least one additional reflecting surface; and a second focus of the ellipsoidal reflecting surface is located at or near a surface of or within the recording media (see Dewald column 6 lines 14-21).

**Regarding claim 57**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reflecting beam from the additional reflecting surface (Dewald column 6 lines 6-13), and wherein said

additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc of any angle between  $0^{\circ}$  and  $45^{\circ}$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of any angle between  $0^{\circ}$  and  $45^{\circ}$ , Dewald discusses reflection at *a plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes any angle between  $0^{\circ}$  and  $45^{\circ}$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include an azimuthal arch of any angle between  $0^{\circ}$  and  $45^{\circ}$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 58**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and said additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc of any angle between  $0^{\circ}$  and  $90^{\circ}$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of any angle between  $0^{\circ}$  and  $90^{\circ}$ , Dewald discusses reflection at *a plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes any angle between  $0^{\circ}$  and  $90^{\circ}$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made

include an azimuthal arch of any angle between  $0^{\circ}$  and  $90^{\circ}$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 59**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and said additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc of at least  $90^{\circ}$  and less than or equal to  $180^{\circ}$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of at least  $90^{\circ}$  and less than or equal to  $180^{\circ}$ , Dewald discusses reflection at *a plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes at least  $90^{\circ}$  and less than or equal to  $180^{\circ}$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include an azimuthal arch of at least  $90^{\circ}$  and less than or equal to  $180^{\circ}$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 60**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and said additional reflecting surface can be rotated about at least one axis to effect redirection of one of

said object or reference beams through an azimuthal arc of at least  $90^\circ$  and less than or equal to  $270^\circ$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of at least  $90^\circ$  and less than or equal to  $270^\circ$ , Dewald discusses reflection at a *plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes at least  $90^\circ$  and less than or equal to  $270^\circ$ .

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include an azimuthal arch of at least  $90^\circ$  and less than or equal to  $270^\circ$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 61**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and said additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc of at least  $90^\circ$  and less than or equal to  $360^\circ$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of at least  $90^\circ$  and less than or equal to  $360^\circ$ , Dewald discusses reflection at a *plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes at least  $90^\circ$  and less than or equal to  $360^\circ$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the



invention was made include an azimuthal arch of at least  $90^\circ$  and less than or equal to  $360^\circ$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 62**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and said additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc of at least  $180^\circ$  and less than or equal to  $360^\circ$  on said ellipsoidal reflecting surface (see Dewald column 6 lines 6-21).

Although Dewald does not explicitly recite an azimuthal arc of at least  $180^\circ$  and less than or equal to  $360^\circ$ , Dewald discusses reflection at *a plurality of angles* and the reference beam for *all angles* of reflection, which clearly suggests to one of ordinary skill in the art that the azimuthal arc includes at least  $180^\circ$  and less than or equal to  $360^\circ$ . Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made include an azimuthal arch of at least  $180^\circ$  and less than or equal to  $360^\circ$  in order to accurately redirect the reference beam toward the storage location.

**Regarding claim 63**, the combination Dewald and Jang disclose the apparatus of claim 49 wherein the additional reflecting surface is a planar mirror (see Dewald Figure 2 element 70).

**Regarding claim 65**, the combination Dewald and Jang disclose the apparatus of claim 49 wherein the additional reflecting surface is an aspherical surface (see Dewald Figure 2 element 70).

**Regarding claim 66**, the combination Dewald and Jang disclose the apparatus of claim 50 wherein said additional reflecting surface and the recording media are disposed on the same side of any plane that is (a) parallel to a surface of the recording media and (b) intersects the ellipsoidal reflecting surface (see Dewald Figure 2).

**Regarding claim 67**, the combination Dewald and Jang disclose the apparatus of claim 66 wherein a portion of the reference beam impinging on the additional reflecting surface is coaxial with an axis formed by the two foci of the ellipsoidal reflecting surface (see Dewald Figure 2).

**Regarding claim 86**, the combination Dewald and Jang disclose the apparatus of claim 56 wherein either the object beam or the reference beam is directed to the ellipsoidal reflecting surface by reflecting either the object beam or the reference beam from the additional reflecting surface (Dewald column 6 lines 6-13), and wherein said additional reflecting surface can be rotated about at least one axis to effect redirection of one of said object or reference beams through an azimuthal arc on said ellipsoidal reflecting surface (see the discussion in the Introduction section on page 2975 particularly regarding peristrophic multiplexing and the combination of peristrophic and angle multiplexing and the discussion on page 2976 sections 2.1 and 2.2).

**5. Claims 53-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dewald (US Patent Number 5,566,387 and Jang et al. (Holographic Data Storage by Combined Use of Peristrophic, Angular, and Spatial Multiplexing) as**

**applied to claim 49 above, and further in view of Dalziel (US PGPub Number 2003/0053232 A1).**

**Regarding claim 53**, the combination of Dewald and Jang disclose the apparatus of claim 49, but fail to disclose that the motive device for rotating the additional reflecting surface is a MEMS device. Dalziel, however, discloses an actuator-controlled mirror wherein the motive device for rotating the additional reflecting surface is a MEMS device (see Dalziel paragraph [0016]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the MEMS device taught by Dalziel into the holographic storage apparatus of Dewald and Jang. One of ordinary skill in the art at the time the invention was made would have been motivated to combine the teachings in order to produce an apparatus that changes the reflected direction of a beam in a controlled and accurate manner (Dalziel paragraphs [0018] and [0019]).

**Regarding claim 54**, the combination of Dewald, Jang, and Dalziel teach the apparatus of claim 49 wherein the motive device for rotating the additional reflecting surface includes two independently controlled one-dimensional galvanometers (see Dalziel paragraph [0018] and the discussion of the one axis galvanometer mirror).

**Regarding claim 55**, the combination of Dewald, Jang, and Dalziel teach the apparatus of claim 49 wherein the motive device for rotating the additional reflecting surface is a one-dimensional galvanometer mounted on a rotary motive device (see Dalziel paragraph [0015] and paragraph [0018] where Dalziel discusses a one axis galvanometer mirror).

***Conclusion***

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

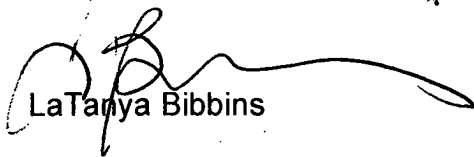
Any inquiry concerning this communication or earlier communications from the examiner should be directed to LaTanya Bibbins whose telephone number is (571) 270-1125. The examiner can normally be reached on Monday through Friday 7:30 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wayne Young can be reached on 571 272-7582. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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LaTanya Bibbins



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PRIMARY EXAMINER